

A Brief Summary of Key Observations: The Conference on Policies for Fostering Sustainable Transportation Technologies

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NOTE: For the complete 125-page summary of this conference (in Acrobat-readable pdf format), [click here](#).

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INTRODUCTION

The 1997 Asilomar Conference focused primarily on the nature of the technological opportunities in the light-duty highway sector, and on the policies needed to integrate those technologies into the system to realize the proper contribution of this sector to a sustainable transportation system. The conference addressed (1) what has worked in the United States in the past (regulation of vehicle emissions and fuel use), (2) the recent and projected tendency to slow down or reverse U.S. reductions in emissions and fuel use (and highway deaths), (3) the need to adjust priorities to deal with new concerns (global warming and fine particulates), and (4) how to achieve a situation where refocused desires for reductions in fuel use and emissions are achieved.

Stephen Wallman (Volvo) noted that achieving significant CO₂ reductions by 2050 or 2100 will require drastic reductions that are inconsistent with the present track.

OBSERVATIONS

Regulation Worked

Regulation of criteria pollutant emissions has cleaned up the air in Los Angeles significantly. To Cackette (California Air Resources Board) explained how the process of regulation in California has evolved and improved; contributing factors cited were greater communication between industry and regulators and more flexible regulations.

Corporate Average Fuel Economy (CAFE) regulations also worked. David Green (Oak Ridge National Laboratory) showed that a fuel economy standard and a fuel tax can be economically efficient and also that even without a tax a vehicular mpg standard can help improve the U.S. economy.

Lee Schipper (International Energy Agency) showed that per capita passenger transportation CO₂ emissions in the United States were reduced between 1973 and 1992, while Europe and Japan had significant increases. The United States, Japan, and Europe all had per capita increases in CO₂ for freight movement during the same period. Among these nations, vehicle fuel economy regulation (through CAFE) affected only U.S. passenger transportation.

Lester Lave (Carnegie-Mellon University) agreed that the regulation of criteria pollutant emissions and fuel economy had worked. He focused on how the regulations might have been made more efficient. He said efficient policy is the issue, not whether the policy is implemented via regulation or taxation.

K.G. Duleep (Energy and Environmental Analysis) observed that the United States and Canada have adopted more fuel-efficient technologies than have Sweden and Australia, which also produce large cars and have low population density. U.S. light-duty vehicles had fuel economy similar to those for the other three nations, but U.S. vehicles had larger interior volumes, even though gasoline prices were lowest in the United States.

Regulations Must Be Flexible

All of the automakers represented opposed single-technology mandates (e.g., ZEV mandates). Instead, they favored flexible regulations that would allow them to choose a mix of technologies to meet an aggregate goal.

Improvements in U.S. Light-Duty Vehicle Fuel Economy and Annual Highway Deaths Have Ceased

Schipper presented graphs illustrating that the United States had clearly improve new light-vehicle fuel economy considerably relative to other industrialized nations and that the country had reduced per capita CO₂ emissions when CAFE was implemented, while Europe and Japan had not. Once the CAFE "plateau" was achieved, however, U.S. fuel economy improvement ceased, but they did not reverse when gasoline prices fell. Since 1982, Schipper noted, all nations have devoted improvements in engine efficiency to higher vehicle performance rather than improved fuel economy. Arguing that mass reduction to improve fuel economy could be accomplished without increasing highway deaths, Greene noted the danger in passenger car occupants from the introduction of large truck models he cited an analysis showing that average truck weight could be reduced by 500 pounds and car weight by 66 pounds, with no loss of life. Greene presented a graph indicating that the long-time trend of declining highway deaths has recently ceased, despite the introduction of air bags Carl Nash (George Washington University, formerly National Highway Transportation Safety Administration) expressed his opinion that the agency had not addressed the incompatibility between cars and light trucks (weight, stiffness, and height) when they collide.

Examination of Fuel Price Effect Implies High Taxes to Obtain Uncertain mpg Increases

Schipper presented a graph of vehicle fuel economy vs. fuel price, showing vehicle kilometers per unit of GDP for six nations. The graph indicated "clustering" of fuel economy values for three sets of nations. Among those nations, higher prices were associated with higher fuel economy. However, no "within country" variation in fuel economy was found for any of the three sets of countries, despite large changes in prices over the periods plotted. Wallman indicated that European cars get about 40% better fuel economy than do U.S. cars, when evaluated by the same test. Duleep indicated that for three countries with low population density

and fuel prices between the U.S. and European average, he could see little difference from U.S. fuel economy.

Schipper and Wallman noted that German car manufacturers, following unusually sharp increases in German motor fuel taxes, had decided to adopt a voluntary fuel economy agreement. Duleep estimated that a fuel price increases lower vehicle sales by 3.4% for every 10% increase in prices. Greene showed a graph that indicates that fuel price swings change the mix of vehicle sizes demanded (small cars are favored when prices rise). Nash recommended higher U.S. fuel taxes that would increase fuel prices by at least 200%. He said that a trade-off would be necessary to make such a tax increase acceptable, suggesting the elimination of either employment taxes or a large portion of income taxes for incomes below about \$100,000. If Duleep's estimates are accepted, it can be inferred that a rapid U.S. increase in fuel prices, intended to obtain the European fuel economy levels cited by Wallman (a 100-200% fuel price increase), would mean a large decline in vehicle sales for U.S. manufacturers, while Greene's graph implied a shift in mix to small (less profitable) vehicles.

Land Use Policy Has Little Potential for Reducing Energy Use

Genevieve Giuliano (University of Southern California) reviewed the evident and concluded that land use policy cannot be relied on to provide reductions in energy use. Her research indicated that worldwide demographic and economic factors favor continued growth inland use, motor vehicle use, and congestion. This is the outcome of market forces around the world, which Giuliano seems as difficult to overcome. While largely conceding the point, Robert Johnson (University of California, Davis) said that land use models do predict significant effects for policies maintained over several decades (~50 years). Johnston said that those involved in land use issues are concerned over habitat loss, not energy use.

Priorities Can Be Contradictory, Vary Over Time, and Must be Traded Off Against One Another

Mark Delucchi (University of California, Davis) expressed concern that CO₂-reduction benefits from selection of a diesel engine for a "next-generation" vehicle may be outweighed by damage from particulate emissions. Cackette noted that even with emerging technologies to obtain near-zero emissions for criteria pollutants from gasoline vehicles, the problem of CO₂ from such vehicles remained unsolved. L. Lave said a diesel PNGV could be sold everywhere. Richard Kassel (Natural Resources Defense Council) indicated that particulate reductions achieved by switching to CNG from diesel in Manhattan are worthwhile, even with increased greenhouse gas emissions.

John German (U.S. Environmental Protection Agency) discussed the new Toyota HEV, which uses an "Atkinson cycle" gasoline engine. He indicated that it appeared to offer nearly all of the

fuel economy benefit of a diesel HEV, without increasing particulate emissions.

Jane Beseda (Toyota) noted the fluctuating priorities of new vehicle buyers with regard to fuel efficiency, observing that when gasoline prices were high, this concern was number two, but now that new-vehicle fuel economy is up and gasoline prices are down, it ranks 15th. Toyota accepts as plausible a scenario in which oil demand will exceed supply in 2007-2014 (high gasoline prices again). Anthony Finizza (ARCO) disagreed, claiming there could be a glut.

Delucchi hoped that full social-cost analysis could lead to an inspiration for a long-term vision. The method sums dollar costs of all damages and identifies the option with the lowest total cost. Several participants indicated that inconsistent goals must be recognized and trade-offs allowed.

Risks of Promoting Higher mpg Are Greater for an Automaker Acting Alone than for the Industry

Beseda states that an automaker acting alone cannot afford the risk of introducing high-fuel-efficiency vehicles. Toyota is concerned that consumers generally will not buy "green vehicles," but she indicated that the company will make an effort to target those customers who will do so.

Greene indicates that the sales loss for a vehicle manufacturer acting alone in introducing a more costly, more fuel-efficient vehicle would be five times as great as if the industry did so collectively. Greene's and Duleep's "elasticity" estimates for vehicle price indicate that if the industry acted together in introducing more costly, high-mpg vehicles, industry revenue would remain constant or rise. Greene noted that consumers in a Toyota focus group video presented by Beseda had indicated that they would not be environmentally conscious if they were the only one to do so; however, they expected the government to develop rules that would encourage environmentally sound behavior and they could accept such rules.

Technology Is Still the Answer

In closing comments, C. Lave (University of California at Irvine) observed that "technology is still the answer!"

Geoffrey Ballard (Ballard Power Systems) emphasized that his company had acquired a level of capitalization that requires the introduction of fuel cells in numerous markets, including a significant portion of transportation, within the next decade. He said that progress on the fuel cell is quite rapid.

Robert Purcell (General Motors) put GM's EV-1 program into context. He pointed out that their development work had already led to technology being adopted in newer GM vehicles in Europe. He cited several other highly successful technologies that got off to a very slow start.

He also noted the benefits of learning about electric drivetrains, which would be used in hybrid vehicles. Finizza indicated that vehicles with electric drive are a high-probability event. He said that petroleum, processed in a refinery, could be used to produce a very-low-sulfur fuel suitable for use in fuel cell vehicles, providing a total energy efficiency consistent with PNGV 3X goals. He indicated opposition to methanol because of the need for new infrastructure to deliver it.

Paul Leiby (Oak Ridge National Laboratory) and Jonathan Rubin (University of Tennessee) presented a computer-modeled CO₂ tax and subsidy scenario leading to over 20% use of biomass-based ethanol (a very low net CO₂ fuel) by 2010, as well as the use of LPG (a fuel with moderately lower CO₂ emissions) in better than 10% of the fuel market by that time.

Cackette said that diesels will be the single largest source of CO_x in California by 2000 and that CARB is considering a major regulatory effort to promote the development of NO_x reduction technologies for heavy vehicles.

Michael Cameron (Environmental Defense Fund) presented three success stories for road pricing. Each was designed to add capacity to existing roadways, increasing the flow of traffic rather than discouraging travel. Effects of flow rate changes on fuel use and regulated emissions apparently were not part of the evaluation calculations; they were not discussed. If his example is representative of the focus for congestion pricing, then technology to improve the fuel economy of vehicles on these roadways will be needed to reduce CO₂ emissions.

Schipper raised an issue involving technology design or objective (and consumer choice). He noted that although average trip distance is fairly uniform (12-14 km) across countries, nearly every vehicle is still designed to be capable of driving long distances on a full tank of fuel.

Greenhouse Gas Emissions Are Not a Major Concern to the Consumer Today

There is a need to "bundle" the disbenefits of auto use to persuade consumers that doing something to restrain greenhouse gas emissions is worthwhile. Delucchi recommended use of fuel social cost analysis. Schipper referred to the "seven deadly sins" of transportation, including habitat loss. Linda Lance (White House Council of Environmental Quality) suggested that consumers are educated and are doing what they choose to do, so that regulation to change the choices is necessary.

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